

## CLAIMS

1. Preventive and/or therapeutic medicines for cancers and chronic rheumatoid arthritis, containing a peptide indicated by the following formula (Ia) or a salt thereof:

1    2   3   4   5   6   7   8   9   10   11   12   13   14

A1-A2-A3-Cys-Tyr-A4-A5-A6-A7-A8-A9-A10-Cys-A11 (Ia)

wherein:

A1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or A1 is deleted;

A2 represents an arginine or glutamic acid residue if A1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or A2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if A1 is deleted;

A3 represents an aromatic amino acid residue;

A4, A5 and A9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

A6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;

A7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

A8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;

A10 represents a citrulline, glutamic acid, arginine or lysine residue;

A11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

2. Preventive and/or therapeutic medicines stated in Claim 1, wherein in the above formula (Ia):

A1 is an arginine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or A1 is deleted;

A2 represents an arginine or glutamic acid residue if A1 is an arginine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or A2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if A1 is deleted;

A4 represents an arginine, citrulline, alanine or glutamic acid residue;

A5 represents an arginine, citrulline, alanine, lysine or glutamic acid residue;

A6 represents a lysine, alanine, citrulline or glutamic acid residue;

A7 represents a proline or alanine residue;

A8 represents a tyrosine, alanine or glutamic acid residue;

A9 represents an arginine, citrulline or glutamic acid residue;

A10 represents a citrulline or glutamic acid residue;

A11 represents an arginine or glutamic acid residue which may be derivatized at C-terminal.

3. Peptide represented by the following formula (Ib) or a salt thereof:

1    2   3   4   5   6   7   8   9   10   11   12   13   14

B1-B2-B3-Cys-Tyr-B4-B5-B6-B7-B8-B9-B10-Cys-B11 (Ib)

wherein:

B1 is a glutamic acid residue which may be derivatized at N-terminal, or B1 is deleted;  
 B2 represents an arginine or glutamic acid residue if B1 is a glutamic acid residue which may be derivatized at N-terminal, or B2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if B1 is deleted;  
 B3 represents an aromatic amino acid residue;  
 B4, B5 and B9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;  
 B6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;  
 B7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;  
 B8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;  
 B10 represents a citrulline, glutamic acid, arginine or lysine residue;  
 B11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;  
 In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

4. Peptide or its salt stated in Claim 3, wherein  
 B1 is a glutamic acid residue which may be derivatized at N-terminal.

5. Peptide indicated by the following formula (Ic) or a salt thereof:

1 2 3 4 5 6 7 8 9 10 11 12 13 14

C1-C2-C3-Cys-Tyr-C4-C5-C6-C7-C8-C9-C10-Cys-C11 (Ic)

wherein:

C1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or C1 is deleted;

C2 represents a glutamic acid residue if C1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or C2 represents a glutamic acid residue which may be derivatized at N-terminal if C1 is deleted;

C3 represents an aromatic amino acid residue;

C4, C5 and C9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

C6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;

C7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

C8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;

C10 represents a citrulline, glutamic acid, arginine or lysine residue;

C11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

6. Peptide represented by the following formula (Id) or a salt thereof:

1 2 3 4 5 6 7 8 9 10 11 12 13 14

D1-D2-D3-Cys-Tyr-D4-D5-D6-D7-D8-D9-D10-Cys-D11 (Id)

wherein:

D1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or D1 is deleted;

D2 represents an arginine or glutamic acid residue if D1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or

D2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if D1 is deleted;

D3 represents an aromatic amino acid residue;

D4 represents a glutamic acid residue;

D5 and D9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

D6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;

D7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

D8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;

D10 represents a citrulline, glutamic acid, arginine or lysine residue;

D11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

7. Peptide indicated by the following formula (Ie) or a salt thereof:

1 2 3 4 5 6 7 8 9 10 11 12 13 14

E1-E2-E3-Cys-Tyr-E4-E5-E6-E7-E8-E9-E10-Cys-E11 (Ie)

wherein:

E1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or E1 is deleted;

E2 represents an arginine or glutamic acid residue if E1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or

E2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if E1 is deleted;

E3 represents an aromatic amino acid residue;

E4 and E9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

E5 represents an arginine or glutamic acid residue;

E6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;

E7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

E8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;

E10 represents a citrulline, glutamic acid, arginine or lysine residue;

E11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

8. Peptide or its salt stated in Claim 7, wherein

E5 represents a glutamic acid residue.

9. Peptide represented by the following formula (If) or a salt thereof:

1 2 3 4 5 6 7 8 9 10 11 12 13 14

F1-F2-F3-Cys-Tyr-F4-F5-F6-F7-F8-F9-F10-Cys-F11 (If)

wherein:

F1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or F1 is deleted;

F2 represents an arginine or glutamic acid residue if F1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or

F2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if F1 is deleted;

F3 represents an aromatic amino acid residue;

F4, F5 and F9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

F6 represents a glutamic acid residue;

F7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

F8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;

F10 represents a citrulline, glutamic acid, arginine or lysine residue;

F11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

10. Peptide represented by the following formula (Ig) or a salt thereof:

1 2 3 4 5 6 7 8 9 10 11 12 13 14

G1-G2-G3-Cys-Tyr-G4-G5-G6-G7-G8-G9-G10-Cys-G11 (Ig)

wherein:

G1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or G1 is deleted;

G2 represents an arginine or glutamic acid residue if G1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or

G2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if G1 is deleted;

G3 represents an aromatic amino acid residue;

G4, G5 and G9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

G6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;

G7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

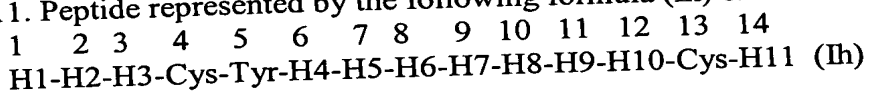
G8 represents a glutamic acid residue;

G10 represents a citrulline, glutamic acid, arginine or lysine residue;

G11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

11. Peptide represented by the following formula (Ih) or a salt thereof:



wherein:

H1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or H1 is deleted;

H2 represents an arginine or glutamic acid residue if H1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or H2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if H1 is deleted;

H3 represents an aromatic amino acid residue;

H4 and H5 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

H6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;

H7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

H8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;

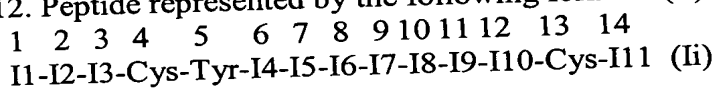
H9 represents a glutamic acid residue;

H10 represents a citrulline, glutamic acid, arginine or lysine residue;

H11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

12. Peptide represented by the following formula (Ii) or a salt thereof:



wherein:

I1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or I1 is deleted;

I2 represents an arginine or glutamic acid residue if I1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or I2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if I1 is deleted;

I3 represents an aromatic amino acid residue;

I4, I5 and I9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

I6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;

I7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

I8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;

I10 represents a glutamic acid, arginine or lysine residue;

I11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

13. Peptide represented by the following formula (Ij) or a salt thereof:

1 2 3 4 5 6 7 8 9 10 11 12 13 14

J1-J2-J3-Cys-Tyr-J4-J5-J6-J7-J8-J9-J10-Cys-J11 (Ij)

wherein:

J1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or J1 is deleted;

J2 represents an arginine or glutamic acid residue if J1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or J2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if J1 is deleted;

J3 represents an aromatic amino acid residue;

J4, J5 and J9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

J6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;

J7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

J8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;

J10 represents a citrulline, glutamic acid, arginine or lysine residue;

J11 represents a glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

wherein, in the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

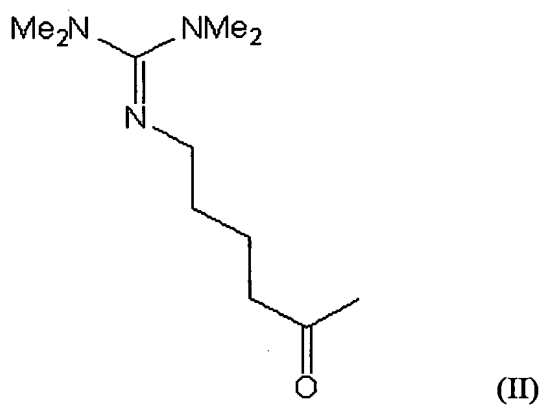
14. Peptide indicated in any of the following items (1) to (58) or a salt thereof:

- (1) Ac-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (2) Ac-Arg-Arg-Nal-Cys-Tyr-Arg-Lys-DCit-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (3) Ac-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DCit-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (4) Ac-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DLys-Pro-Tyr-Cit-Cit-Cys-Arg-OH;
- (5) Ac-Cit-Arg-Nal-Cys-Tyr-Cit-Lys-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (6) Ac-Cit-Arg-Nal-Cys-Tyr-Arg-Lys-DCit-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (7) Ac-Arg-Arg-Nal-Cys-Tyr-Arg-Lys-DCit-Pro-Tyr-Cit-Cit-Cys-Arg-OH;
- (8) Ac-Cit-Arg-Nal-Cys-Tyr-Arg-Lys-DLys-Pro-Tyr-Cit-Cit-Cys-Arg-OH;
- (9) Ac-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DCit-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (10) Ac-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DLys-Pro-Tyr-Cit-Cit-Cys-Arg-NH<sub>2</sub>;
- (11) Ac-Cit-Arg-Nal-Cys-Tyr-Cit-Lys-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (12) Ac-Cit-Arg-Nal-Cys-Tyr-Arg-Lys-DCit-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (13) Ac-Arg-Arg-Nal-Cys-Tyr-Arg-Lys-DCit-Pro-Tyr-Cit-Cit-Cys-Arg-NH<sub>2</sub>;
- (14) Ac-Cit-Arg-Nal-Cys-Tyr-Arg-Lys-DLys-Pro-Tyr-Cit-Cit-Cys-Arg-NH<sub>2</sub>;
- (15) H-DGlu-Arg-Nal-Cys-Tyr-Arg-Lys-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (16) H-Arg-Glu-Nal-Cys-Tyr-Arg-Lys-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (17) H-Arg-Arg-Nal-Cys-Tyr-Glu-Lys-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (18) H-Arg-Arg-Nal-Cys-Tyr-Arg-Glu-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (19) H-Arg-Arg-Nal-Cys-Tyr-Arg-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (20) H-Arg-Arg-Nal-Cys-Tyr-Arg-Lys-DLys-Pro-Tyr-Glu-Cit-Cys-Arg-OH;
- (21) H-Arg-Arg-Nal-Cys-Tyr-Arg-Lys-DLys-Pro-Tyr-Arg-Cit-Cys-Glu-OH;
- (22) H-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (23) H-Arg-Arg-Nal-Cys-Tyr-DGlu-Lys-DCit-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;

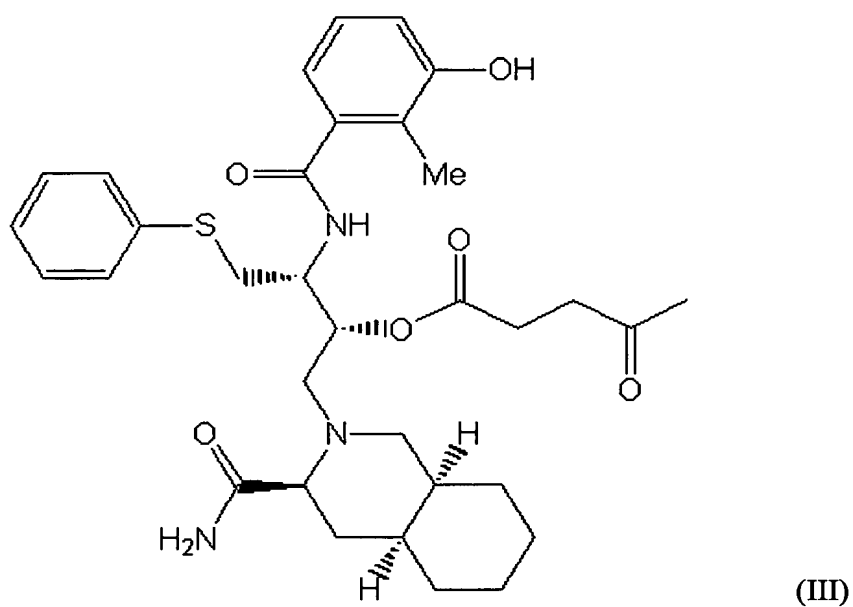
- (24) H-Arg-Arg-Nal-Cys-Tyr-DGlu-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (25) H-DGlu-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (26) H-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-DGlu-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (27) H-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-DGlu-Cys-Arg-NH<sub>2</sub>;
- (28) Ac-DGlu-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (29) Ac-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-DGlu-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (30) Ac-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-DGlu-Cys-Arg-NH<sub>2</sub>;
- (31) Ac-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (32) guanyl-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (33) TMguanyl-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (34) TMguanyl-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (35) 4F-benzoyl-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (36) 2F-benzoyl-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (37) APA-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (38) desamino-R-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (39) guanyl-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (40) succinyl-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (41) glutaryl-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (42) deaminoTMG-APA-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (43) nelfinaviryl-succinyl-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (44) AZT-glutaryl-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (45) R-CH<sub>2</sub>-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (46) H-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (47) TMguanyl-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DCit-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (48) ACA-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DCit-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (49) ACA-Arg-Arg-Nal-Cys-Tyr-Arg-Lys-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-OH;
- (50) H-Arg-Arg-Nal-Cys-Tyr-Cit-Arg-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (51) Ac-Arg-Arg-Nal-Cys-Tyr-Cit-Arg-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (52) Ac-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (53) Ac-Arg-Arg-Nal-Cys-Tyr-Arg-Lys-DCit-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (54) 4F-benzoyl-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DLys-Pro-Tyr-Arg-Cit-Cys-Arg-NH<sub>2</sub>;
- (55) 4F-benzoyl-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NHMe
- (56) 4F-benzoyl-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NHEt
- (57) 4F-benzoyl-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-NHiPr
- (58) 4F-benzoyl-Arg-Arg-Nal-Cys-Tyr-Cit-Lys-DGlu-Pro-Tyr-Arg-Cit-Cys-Arg-tyramine;

wherein,

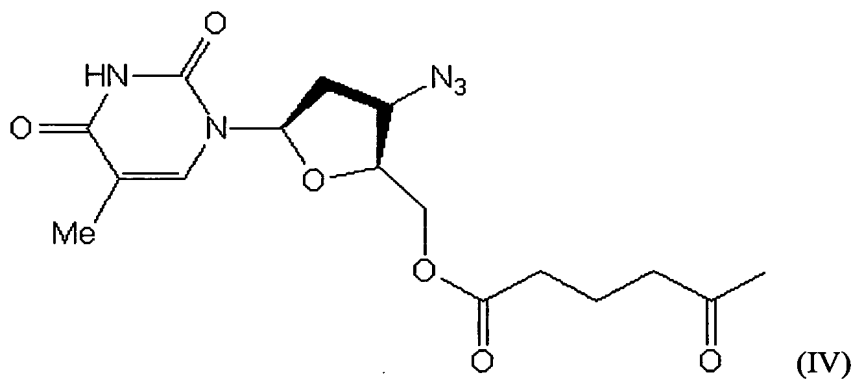
in each sequence, the symbol put in the left part of N-terminal amino acid shows derivatization or non-derivatization of amino group; H shows non-derivatization, Ac shows acetyl group, guanyl shows guanyl group, succinyl shows succinyl group, glutaryl shows glutaryl group, TMguanyl shows tetra-methyl guanyl group, 2F-benzoyl shows 2-fluorobenzoyl group, 4F-benzoyl shows 4-fluorobenzoyl group, APA shows 5-amino-pentanoyl group, ACA shows 6-amino-hexanoyl group, desamino-R shows 2-desamino-arginyl group, deaminoTMG-APA shows the following formula(II),



nelfinaviryl-succinyl shows the following formula (III),

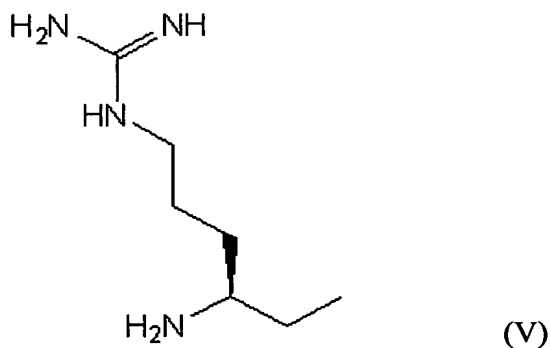


AZT-glutaryl shows the following formula (IV),



R-CH2 shows the following formula (V)





Arg shows L-arginine residue, Nal show L-3-(2-naphtyl)alanine residue, Cys shows L-cysteine residue, Tyr shows L-tyrosine residue, Cit shows L-citrulline residue, Lys shows L-lysine residue, DLys shows D-lysine residue, Pro shows L-proline residue, DCit shows D-citrulline residue, DGlu shows D-glutamic acid residue, Glu shows L-glutamic acid residue, 2 cysteine residues are combined by intramolecular disulfide bond, the symbol attached to the right part of C-terminal amino acid shows derivatization or non-derivatization of carboxyl group, OH shows non-derivatization, NH<sub>2</sub> shows amidation by amino group, NHMe shows amidation by methamino group, NHEt shows amidation by ethylamino group, NHiPr shows amidation by isopropylamino group, tyramine shows amidation by p-hydroxyphenylethylamino group.

15. Pharmaceutical products containing any of the peptides stated in any of Claim 3 to Claim 14 or any salt of the peptide.

16. CXCR4 antagonists belonging to the pharmaceutical products stated in Claim 15.

17. Preventive and/or therapeutic medicines for cancers or chronic rheumatoid arthritis belonging to the pharmaceutical products stated in Claim 15.

18. Medicines stated in Claim 17 usable for breast cancer or pancreatic cancer.

19. Preventive and/or therapeutic methods for cancers or chronic rheumatoid arthritis by administration to mammals of effective doses of a peptide stated in any of Claim 3 to Claim 14 or a salt thereof.

20. Use of a peptide stated in any of Claim 3 to Claim 14 or a salt thereof for the manufacturing of preventive and/or therapeutic medicines for cancers or chronic rheumatoid arthritis.

21. Preventive and/or therapeutic methods for cancers or chronic rheumatoid arthritis by administration to mammals of effective doses of a peptide represented by the following formula (Ia) or a salt thereof:

1    2   3   4   5   6   7   8   9   10   11   12   13   14

A1-A2-A3-Cys-Tyr-A4-A5-A6-A7-A8-A9-A10-Cys-A11 (Ia)

wherein:

A1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or A1 is deleted;

A2 represents an arginine or glutamic acid residue if A1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or A2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if A1 is deleted;

A3 represents an aromatic amino acid residue;

A4, A5 and A9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

A6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;

A7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

A8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;

A10 represents a citrulline, glutamic acid, arginine or lysine residue;

A11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.

22. Use of a peptide represented by the following formula (Ia) or a salt thereof for the manufacturing of preventive and/or therapeutic medicines for cancers or chronic rheumatoid arthritis:

1 2 3 4 5 6 7 8 9 10 11 12 13 14

A1-A2-A3-Cys-Tyr-A4-A5-A6-A7-A8-A9-A10-Cys-A11 (Ia)

wherein:

A1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or A1 is deleted;

A2 represents an arginine or glutamic acid residue if A1 is an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue which may be derivatized at N-terminal, or A2 represents an arginine or glutamic acid residue which may be derivatized at N-terminal if A1 is deleted;

A3 represents an aromatic amino acid residue;

A4, A5 and A9 each independently represents an arginine, lysine, ornithine, citrulline, alanine or glutamic acid residue;

A6 represents a proline, glycine, ornithine, lysine, alanine, citrulline, arginine or glutamic acid residue;

A7 represents a proline, glycine, ornithine, lysine, alanine, citrulline or arginine residue;

A8 represents a tyrosine, phenylalanine, alanine, naphthylalanine, citrulline or glutamic acid residue;

A10 represents a citrulline, glutamic acid, arginine or lysine residue;

A11 represents an arginine, glutamic acid, lysine or citrulline residue which may be derivatized at C-terminal;

In the above formula, Cys represents a cysteine residue, Tyr represents a tyrosine residue, the cysteine residues of the 4-position and the 13-position can be combined by disulfide bond, and the amino acid can be either L or D form.